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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,092	04/08/2004	Francisco Juarez	NOVE100041000	8981

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EXAMINER

MILLER, MICHAEL G

ART UNIT	PAPER NUMBER
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1709

MAIL DATE	DELIVERY MODE
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05/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/821,092

Applicant(s)

JUAREZ ET AL.

ExaminerMichael G. Miller *MGM***Art Unit**

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004 and 08 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 11-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Preliminary Remarks

- 1) Examiner notes the preliminary amendment submitted by Applicant in this case. As the preliminary amendment was submitted to correct typographical and format errors and introduced no new matter into the application, the preliminary amendment is accepted.

Election/Restrictions

- 2) Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - i) Claims 1-10, drawn to a method of depositing a material on a substrate, classified in class 427, subclass 248.1.
 - ii) Claims 11-19, drawn to an apparatus for depositing a material on substrate, classified in class 118, subclass 729.
- 3) Restriction between a method and an apparatus for its practice is proper if
Inventions i and ii are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus of ii can be used in etching operations as opposed to coating operations.
- 4) Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given

above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- i) the inventions have acquired a separate status in the art in view of their different classification;
- ii) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- iii) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- iv) the prior art applicable to one invention would not likely be applicable to another invention;
- v) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

5) Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

6) The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely

Art Unit: 1709

traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

- 7) If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.
- 8) Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.
- 9) During a telephone conversation with Peter Peterson on 2 May 2007, a provisional election was made with traverse to prosecute the invention of methods of depositing a material on a substrate, claims 1-10. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11-19 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

- 10) The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 1709

- 11) Claims 6-7 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
- 12) Claims 6-7 recite the limitation "the second chamber section" in their claim language. There is insufficient antecedent basis for this limitation in the claim, as no mention of a second chamber section is mentioned in Claim 1 from which these claims depend.

Claim Rejections - 35 USC § 102

- 13) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

- 14) Claims 1 and 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Ebe et al. (U.S. Patent 5,728,425, hereinafter '425).

i) With regard to Claim 1, '425 teaches a method of depositing material on a substrate comprising:

- (a) Providing a reactor (Figure 1, 1) with a reaction chamber having a first volume (Column 3 Lines 61-64);
- (b) Contacting a surface of a substrate (Figure 1, 5) in the reaction chamber with a first precursor (Figure 1, 31-33) at the first chamber volume (Figure 3B, the space between the top of 22 and the top of 1)

Art Unit: 1709

to react with and deposit a first layer on the substrate (Column 4 Lines 1-11); and

(c) Enlarging the reaction chamber to a second, larger volume (Figure 1, the space between the top of 22 and the top of 1) and removing (Figure 1, 26-27) undeposited first precursor and any excess reaction product to end reaction of the first precursor with the substrate (Column 4 Lines 14-19).

ii) With specific regard to Claim 6, which includes all the limitations of Claim 1 above, '425 teaches:

(a) Wherein the second chamber section (Figure 3B, the space between the bottom of 22 and the top of 28) is on one or more sides of the pedestal (Figure 3B, 22).

iii) With specific regard to Claim 7, which includes all the limitations of Claim 1 above, '425 teaches:

(a) Wherein the second chamber section (Figure 3B, the space between the bottom of 22 and the top of 28) is below the pedestal (22, Figure 3B).

Claim Rejections - 35 USC § 103

15) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention

Art Unit: 1709

was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16) Claims 2-4, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over '425 as applied to claim 1 above, and further in view of Luo et al. (U.S. PGPub 2003/0059535, hereinafter '535).

i) With specific regard to Claim 2, which includes all the limitations of Claim 1 above:

(a) '425 teaches resetting the chamber at the end of a cycle to be ready for another cycle (Column 4 Lines 14-19).

(b) '425 does not explicitly teach using different precursors in different sequential deposition cycles.

(c) '535 teaches a process of alternating two precursors to lay down a material film on a substrate with the advantage that the alternation of ultra-thin layers produces a low surface roughness (Paragraph 0029 Lines 6-8).

(d) Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of deposition as taught in '425 to include the alternation of precursors as taught in '535 because '425 teaches repetition of deposition cycles with a single precursor, '535 teaches that deposition of different precursors can happen in separate sequential steps, and '535 teaches that alternating multiple precursors to lay down a material film on a substrate produces a film with a low surface roughness.

- ii) Claim 8 is rejected on the same grounds as Claim 2, since Claim 8 has the same scope as Claims 1 and 2 combined.
- iii) With specific regard to Claim 10, which includes all the limitations of Claim 8 above, '425 teaches:
 - (1) Wherein the second chamber section (Figure 3B, the space between the bottom of 22 and the top of 28) is below the pedestal (Figure 3B, 22).
- iv) With specific regard to Claim 3, which includes all the limitations of Claim 1 above:
 - (a) '425 teaches evacuating the system by opening an outlet valve (Figure 1, 27) to remove residual gasses (Column 4 Lines 14-19).
 - (b) '425 does not explicitly teach purging the reaction chamber at the second volume with a gas.
 - (c) '535 teaches that a purge operation can be performed before and after precursor flow steps (Paragraph 0034).
 - (d) '535 teaches that the purge operation is performed to remove residual and remaining reactive gasses and reactive gas products (Paragraph 0034).
 - (e) '425 discloses the claimed invention except for using a gas stream to purge the reaction chamber. It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the outlet valve of '425 with the gas stream mechanism of '535 since it was known in the art that opening an outlet valve to release gas from

Art Unit: 1709

the chamber and pushing gas through the chamber to displace byproduct gasses were both methods to purge compounds from a chamber.

v) With specific regard to Claim 4, which includes all the limitations of Claim 1 above:

- (a) '425 teaches evacuating the system by opening an outlet valve (Figure 1, 27) to remove residual gasses (Column 4 Lines 14-19).
- (b) '425 does not explicitly teach purging the reaction chamber at the second volume with a vacuum pump.
- (c) '535 teaches that a vacuum pump operation can be performed before and after precursor flow steps (Paragraph 0034).
- (d) '535 teaches that the vacuum operation is performed to remove residual and remaining reactive gasses and reactive gas products (Paragraph 0034).
- (e) '425 discloses the claimed invention except for using a vacuum pump to purge the reaction chamber. It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the outlet valve of '425 with the vacuum pump mechanism of '535 since it was known in the art that opening an outlet valve to release gas from the chamber and pulling gas from the chamber to displace byproduct gasses were both methods to purge compounds from a chamber.

17) Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over '425 as applied to claims 1 and 8 above.

i) With specific regard to Claim 5, which includes all the limitations of Claim 1 above:

(a) '425 teaches a pedestal (Figure 3B, 22) movable between first and second positions (Figures 1 and 3B, Column 4 Lines 14-19).

(b) '425 teaches a first chamber section above the pedestal in the first position defining the first chamber volume (Figure 3B).

(c) '425 teaches a second chamber section outside the first chamber section (Figure 3B, the area underneath the pedestal).

(d) '425 teaches wherein the reaction chamber is enlarged to the second, larger volume by moving the pedestal to the second, larger volume by moving the pedestal to the second position such that the first and second chamber sections together with the pedestal in the second position define the second chamber volume (Figure 1 and 3C, Column 4 Lines 14-19).

(e) '425 discloses the claimed invention except for placing the substrate holder on the pedestal. It would have been an obvious matter of design choice to move the substrate holder from the top of the reactor to the pedestal, since it has been held that rearranging parts of an invention only involves routine skill in the art. *In re Japikse*, 86 USPQ 70.

Art Unit: 1709

- ii) Claim 9 is rejected on the same grounds as Claim 5, the only difference being that Claim 9 depends from Claim 8 instead of Claim 1.

Conclusion

18) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. PGPubs 2001/0002280 (Sneh, '280) and 2003/0031807 (Elers et al, '807) and U.S. Patent 5,213,650 (Wang et al, '650) all describe cyclic CVD methods; '280 and '807 also discuss methods with purge steps.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael G. Miller whose telephone number is (571) 270-1861. The examiner can normally be reached on MTWR 7:30 - 5:00, F 7:30 - 4:00, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1709

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MGM *MGM*


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PRIMARY EXAMINER